I claim:

1. A multi-channel satellite uplink transmission system dividing an original digital signal into a plurality of digital subchannels and adding a common timing signal to each subchannel, the multi-channel uplink transmission system comprising:

a subchannel divider for transforming the original digital signal into the plurality of digital subchannel signals such that each digital subchannel signal contains at least some information unique to that subchannel signal and also such that a bit rate of each digital subchannel signal is lower than a bit rate of the original digital signal;

a timing generator for generating a periodic signal;

signal combining means, coupled to the timing generator and the subchannel divider, for adding the periodic signal to each subchannel signal within a bandwidth of each subchannel signal such that no additional bandwidth allocation is required to transmit the periodic signal, and in accordance therewith generating a plurality of modulated carrier signals;

upconverting means, coupled to the signal combining means, for translating a frequency of each modulated carrier signal to a frequency of a selected one of a plurality of satellite transponders;

amplifier means, coupled to the upconverting means, for increasing a power level of each translated modulated carrier signal; and

antenna means, coupled to the amplifier means, for directing a radio frequency wave corresponding to each translated modulated carrier signal toward a receiving antenna of each selected satellite transponder.

2. The uplink transmission system of claim 1 wherein at least some of the satellite transponders associated with the plurality of digital subchannel signals are located on one satellite.

3. The uplink transmission system of claim 1 wherein the periodic signal associated with any particular subchannel signal is transmitted to a single satellite associated with said any particular subchannel signal.

4. The uplink transmission system of claim 3 wherein at least some of the satellite transponders associated with the modulated carrier signals are located on one satellite.

5. A receiving terminal system collecting signals from a plurality of satellite transponders and creating a delayed reconstruction of an original digital signal, the receiving terminal system comprising:

one of:

a multiple beam antenna simultaneously receiving the signals from the plurality of transponders and presenting each of said signals on a corresponding one of a plurality of separate output ports; and

a plurality of independent single beam antennas simultaneously receiving the signals from the plurality of transponders and presenting each of said signals on said corresponding one of said plurality of separate output ports;

a plurality of tuners, each coupled to each separate output port, for translating a frequency of each received signal to ~~a fixed~~ intermediate frequency;

a plurality of demodulators, each coupled to each tuner, for demodulating each tuner output and creating a plurality of bit streams each corresponding to an information content of an associated subchannel;

a plurality of delay means, each coupled to a demodulator output, for delaying one or more first-arriving of the plurality of bit streams such that outputs of the plurality of delay means are synchronized in time;

a digital combiner, coupled to the outputs of the plurality of delay means, for combining information in each of the outputs of the plurality of delay means into the delayed reconstruction of the original digital signal;

a timing signal correlator, coupled to each tuner output, for measuring a relative delay between each received signal and in accordance therewith generating a timing signal correlation signal;

a nonvolatile memory for storing information about a frequency property and a propagation delay property of each of a plurality of virtual channels to be selected, and in accordance therewith generating a plurality of nonvolatile memory signals; and

a controller, coupled to the one of the multiple beam antenna and the plurality of independent single beam antennas, the plurality of tuners, the plurality of delay means, the timing signal correlator, and the nonvolatile memory, for receiving the timing signal correlation signal and the nonvolatile memory signals and issuing a plurality of control signals to the one of the multiple beam antenna and the plurality of independent single beam antennas setting a beam direction and a polarization, a plurality of tuner control signals to the plurality of tuners to set a plurality of subchannel receive frequencies, and a plurality of delay control signals to the plurality of delay means to synchronize the outputs of the delay means.

6. The receiving terminal system of claim 5 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

7. The receiving terminal system of claim 5 wherein a timing signal associated with a particular subchannel is transmitted on one satellite in a separate frequency allocation as an information-bearing carrier, and the controller operates firstly to direct the tuners to receive the timing signal to measure a relative propagation delay of the subchannels, secondly to set an amount of delay in the plurality of delay means in accordance with the relative propagation delays measured in the first step, and thirdly to redirect the tuners to receive the associated information-bearing subchannels.

8. The receiving terminal system of claim 7 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

9. A multi-channel satellite uplink transmission system dividing an original digital signal into a plurality of digital subchannel signals and adding a common timing signal to each subchannel, the multi-channel uplink transmission system comprising:

a subchannel divider for transforming the original digital signal into the plurality of digital subchannel signals such that each digital subchannel signal carries identical information at a same bit rate as the original digital signal;

a timing generator for generating a periodic signal,

signal combining means, coupled to the timing generator and the subchannel divider, for adding the periodic signal to each subchannel signal within a bandwidth of each subchannel signal such that no additional bandwidth allocation is required to transmit the periodic signal, and in accordance therewith generating a plurality of modulated carrier signals;

upconverting means, coupled to the signal combining means, for translating a frequency of each modulated carrier signal to a frequency of a selected one of a plurality of satellite transponders;

amplifier means, coupled to the upconverting means, for increasing a power level of each translated modulated carrier signal; and

antenna means, coupled to the amplifier means, for directing a radio frequency wave corresponding to each translated modulated carrier signal toward a receiving antenna of each selected satellite transponder.

10. The satellite uplink transmission system of claim 9 wherein at least some of the transponders associated with the plurality of digital subchannel signals are located on one satellite.

~~11. The satellite uplink transmission system of claim 9 wherein the periodic signal associated with a particular subchannel is transmitted on one satellite in a separate frequency allocation as an information-bearing carrier, and the controller operates firstly to direct the tuners to receive the frequency-separated periodic signal to measure a relative propagation delay of the subchannels, secondly to set an amount of delay in the plurality of delay means in accordance with the relative propagation delays measured in the first step, and thirdly to redirect the tuners to receive the associated information-bearing subchannels.~~

12. The satellite uplink transmission system of claim 11 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

13. A receiving terminal system collecting signals from a plurality of satellite transponders and creating a delayed reconstruction of an original digital signal, the receiving terminal system comprising:

one of:

a multiple beam antenna simultaneously receiving the signals from the plurality of satellite transponders and presenting each of said signals on a corresponding one of a plurality of separate output ports; and

a plurality of independent single beam antennas simultaneously receiving the signals from the plurality of transponders and presenting each of said signals on said corresponding one of said plurality of separate output ports;

a plurality of tuners, each coupled to each separate output port, for translating a frequency of each received signal to a ~~fixed intermediate~~ frequency;

a plurality of demodulators, each coupled to each tuner, for demodulating each tuner output and each creating one of a plurality of streams of soft decisions in the form of digitized decision-confidence-values corresponding to an associated subchannel;

a plurality of delay means, each coupled to a demodulator output, for delaying one or more first-arriving of the streams of soft decisions such that the streams of soft decisions output from the plurality of delay means are synchronized in time;

a digital combiner, coupled to the outputs of the plurality of delay means, for combining soft decisions from all subchannels received into a delayed reconstruction of the original digital signal;

a timing signal correlator, coupled to each tuner output, for measuring a relative delay between arriving subchannel signals, and in accordance therewith generating a timing signal correlation signal;

a nonvolatile memory for storing information about a frequency property and a propagation delay property of a plurality of virtual channels to be selected, and in accordance therewith generating a plurality of nonvolatile memory signals; and

a controller, coupled to the one of the multiple beam antenna and the plurality of independent single beam antennas, the plurality of tuners, the plurality of delay means, the timing signal correlator, and the nonvolatile memory, for receiving the timing signal correlation signal and the nonvolatile memory signals and issuing control signals to the one of the multiple beam antenna and the plurality of independent single beam antennas setting a beam direction and a polarization, a plurality of tuner control signals to the tuners to set a plurality of subchannel receive frequencies, and a plurality of delay control signals to the plurality of delay means to synchronize the outputs of the delay means.

14. The receiving terminal system of claim 13 further comprising:

a digital correlator, coupled to the delay means outputs, for providing an additional measure of the relative delay between channels.

15. The receiving terminal system of claim 13 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

16. The receiving terminal system of claim 13 wherein a timing signal associated with a particular subchannel is transmitted on one satellite in a separate frequency allocation as an information-bearing carrier, and the controller operates firstly to direct the tuners to receive the frequency-separated periodic signal to measure a relative propagation delay of the subchannels, secondly to set an amount of delay in the plurality of delay means in accordance with the relative propagation delays measured in the first step, and thirdly to redirect the tuners to receive the associated information-bearing subchannels.

17. The receiving terminal system of claim 16 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

18. A multi-channel satellite uplink transmission system dividing an original analog signal into a plurality of analog subchannel signals and adding a common timing signal to each analog subchannel signal, the multi-channel uplink transmission system comprising:

a subchannel divider for transforming the original analog signal into the plurality of analog subchannel signals such that each analog subchannel signal contains at least some information unique to that subchannel signal;

a timing generator for generating a periodic signal;

signal combining means, coupled to the timing generator and the subchannel divider, for adding the periodic signal to each subchannel signal within a bandwidth of each subchannel signal such that no additional bandwidth allocation is required to transmit the periodic signal, and in accordance therewith generating a plurality of modulated carrier signals;

upconverting means, coupled to the signal combining means, for translating a frequency of each modulated carrier signal to a frequency of a selected one of a plurality of satellite transponders;

amplifier means, coupled to the upconverting means, for increasing a power level of each translated modulated carrier signal; and

antenna means, coupled to the amplifier means, for directing a radio frequency wave corresponding to each translated modulated carrier signal toward a receiving antenna of each selected satellite transponder.

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19. The satellite uplink transmission system of claim 18 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

20. The satellite uplink transmission system of claim 18 wherein the plurality of subchannels contain identical information, and associated carriers are modulated identically.

21. The satellite uplink transmission system of claim 20 wherein at least some of the subchannels are located on one satellite.

22. The satellite uplink transmission system of claim 20 wherein the periodic signal associated with a particular subchannel is transmitted in four separate frequency allocations but on one satellite with the information-bearing carrier.

23. The satellite uplink transmission system of claim 22 wherein at least some of the transponders associated with the plurality of subchannels are located on said one satellite.

24. A receiving terminal system collecting analog signals from a plurality of satellite transponders and creating a delayed reconstruction of an original analog signal, the receiving terminal system comprising:

one of:

a multiple beam antenna simultaneously receiving the analog signals from the plurality of satellite transponders and presenting each of said analog signals on a corresponding one of a plurality of separate output ports; and

a plurality of independent single beam antennas simultaneously receiving the analog signals from the plurality of satellite ~~transponders and pre~~senting each of said analog signals on the corresponding one of the plurality of separate output ports;

a plurality of tuners, each coupled to each separate output port, for translating a frequency of each received analog signal to a fixed intermediate frequency;

a plurality of demodulators, each coupled to each tuner, for demodulating each tuner output and each creating one of the analog signals corresponding to an information content of an associated subchannel;

a plurality of delay means, each coupled to a demodulator output, for delaying one or more first-arriving of the subchannel signals such that outputs of the plurality of delay means are synchronized in time;

an analog combiner, coupled to the outputs of the plurality of delay means, for combining information in each of the subchannels into the delayed reconstruction of the original analog signal;

a timing signal correlator, coupled to each of the plurality of tuners, for measuring a relative delay between arriving subchannel signals, and in accordance therewith generating a timing signal correlation signal;

a nonvolatile memory for storing information about a frequency property and a propagation delay property of a plurality of virtual channels to be selected, and in accordance therewith generating a plurality of nonvolatile memory signals; and

a controller, coupled to the one of the multiple beam antenna and the plurality of independent single beam antennas, the plurality of tuners, the plurality of delay means, the timing signal correlator, and the nonvolatile memory, for receiving the timing signal correlation signal and the nonvolatile memory signals and issuing control signals to the one of the multiple beam antenna and the plurality of independent single beam antennas setting a beam direction and a polarization, a plurality of tuner control signals to the tuners to set a plurality of subchannel receive frequencies, and a plurality of delay control signals to the plurality of delay means to synchronize the outputs of the delay means.

25. The receiving terminal system of claim 24 wherein the analog combiner provides additional relative subchannel delay information to the controller.

26. The receiving terminal system of claim 24 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

27. The receiving terminal system of claim 24 wherein a timing signal associated with a particular subchannel is transmitted on one satellite in a separate frequency allocation as an information-bearing carrier, and the controller operates firstly to direct the tuners to receive the frequency separated timing signal to measure a relative propagation delay of the subchannels, secondly to set an amount of delay in the plurality of delay means in accordance with the relative propagation delays measured in

the first step, and thirdly to redirect the tuners to receive the associated information-bearing subchannels.

28. The receiving terminal system of claim 27 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

29. The receiving terminal system of claim 24 wherein the plurality of subchannels contain identical information, and associated carriers are modulated identically.

30. The receiving terminal system of claim 29 wherein the analog combiner provides additional relative subchannel delay information to the controller.

31. The receiving terminal system of claim 29 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

32. The receiving terminal system of claim 29 wherein a timing signal associated with a particular subchannel is transmitted on one satellite in a separate frequency allocation as an information-bearing carrier, and the controller operates firstly to direct the tuners to receive the frequency separated timing signal to measure a relative propagation delay of the subchannels, secondly to set an amount of delay in the plurality of delay means in accordance with the relative propagation delays measured in the first step, and thirdly to redirect the tuners to receive the associated information-bearing subchannels.

33. The receiving terminal system of claim 32 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.

34. A multi-channel satellite uplink transmission system dividing an original digital multiplexed signal into a plurality of independent digital subchannels, the multichannel uplink transmission system comprising:

a subchannel divider for transforming the original digital multiplexed signal into the plurality of independent digital subchannels such that an information content of a given independent component of the original digital multiplexed signal is contained entirely within one of the plurality of independent digital subchannels;

modulator means, coupled to the signal combining means, for generating an intermediate frequency radio frequency carrier associated with each of the plurality of independent digital subchannels;

upconverting means, coupled to the modulator means, for translating a frequency of each independent digital subchannel to a frequency of a corresponding satellite transponder;

amplifier means, coupled to the upconverting means, for increasing a power of each translated, timing-added independent digital subchannel; and

antenna means, coupled to the amplifier means, for directing a radio frequency wave corresponding to each amplified independent digital subchannel toward a receiving antenna of each selected satellite transponder.

35. A receiving terminal system collecting signals from a plurality of satellite transponders and selecting a subchannel signal containing a desired independent component of an original multiplex signal, the receiving terminal system comprising:

one of:

a multiple beam antenna receiving the signals from the plurality of satellite transponders and presenting the selected subchannel signal on an output port; and

a plurality of independent single beam antennas receiving the signals from the plurality of satellite transponders and presenting the selected subchannel signal on the output port;

a tuner, coupled to each output port, for translating a frequency of the received selected subchannel signal to a fixed intermediate frequency;

a demodulator, coupled to the tuner, for demodulating each tuned selected subchannel signal and creating a bit stream corresponding to an information content of each corresponding tuned selected subchannel signal;

a nonvolatile memory for storing information about a frequency property of a plurality of virtual channels to be selected, and in accordance therewith generating a plurality of nonvolatile memory signals; and

a controller, coupled to the one of the multiple beam antenna and the plurality of independent single beam antennas, the ~~tuner~~, and the nonvolatile memory, for receiving the plurality of nonvolatile memory signals and issuing antenna control signals to the one of the multiple beam antenna and the plurality of independent single beam antennas setting a beam direction and a polarization, and issuing tuner control signals to the tuner to set a subchannel receive frequency.

36. The receiving terminal system of claim 35 wherein at least some of the transponders associated with the plurality of subchannels are located on one satellite.